

# What is Neurotheology? (Part 2)

The multidisciplinary field of scholarship that seeks to understand the relationship between the human brain and religion.

## Andrew B. Newberg, MD

*Andrew B. Newberg, MD, is board-certified in internal medicine and nuclear medicine, and is a preeminent neuroscientist who has devoted his life to studying the links among spirituality, contemplative practices, and brain function. Here, Dr. Newberg discusses the burgeoning field of neurotheology and why it is important for clinicians to understand more about this area of medicine and its potential impact on people's health.*

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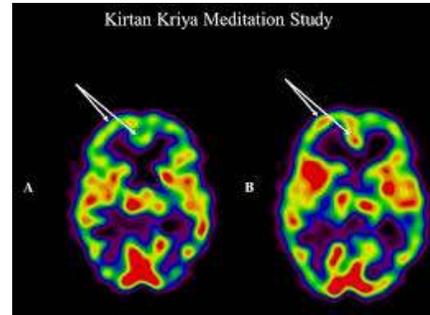
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## Dr. Newberg's longitudinal research in meditation practices.

Meditation practices actually change the brain over time.

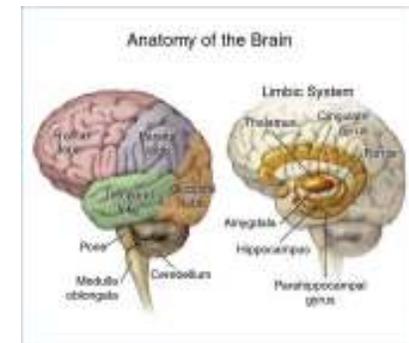
Findings



Structures such as the frontal lobe and thalamus were different over an eight-week period of daily meditation.

The thalamus is:

- A central structure that helps regulate many brain processes and also
- The primary pathway for sensory perceptions.
- Some have even argued that the thalamus is the seat of consciousness.



If the thalamus can be affected by only eight weeks of meditation, one can imagine what might happen to the brain when a religious individual participates in services and prayers over many years of a lifetime.

And since the brain functions are changing, the person's beliefs and behaviors are also changing.

The brain changes reported to be associated with religious and spiritual practices hint at how they also reduce anxiety and depression while enhancing compassion and love.

# Meditation Effects on Cognitive Function and Cerebral Blood Flow In Subjects with Memory Loss: A Preliminary Study

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**Abstract.** This preliminary study determined if subjects with memory loss problems demonstrate changes in memory and cerebral blood flow (CBF) after a simple 8-week meditation program. Fourteen subjects with memory problems had an IV inserted and were injected with 250MBq of Tc-99m ECD while listening to a neutral stimulus CD. They then underwent a pre-program baseline SPECT scan. Then subjects were guided through their first meditation session with a CD, during which they received an injection of 925MBq ECD, and underwent a pre-program meditation scan. Subjects completed an 8-week meditation program and underwent the same scanning protocol resulting in a post-program baseline and meditation scan. A region of interest (ROI) template obtained counts in each ROI normalized to whole brain to provide a CBF ratio. Baseline and meditation scans and neuropsychological testing were compared before and after the program. The meditation program resulted in significant increases ( $p < 0.05$ ) in baseline CBF ratios in the prefrontal, superior frontal, and superior parietal cortices. Scores on neuropsychological tests of verbal fluency, Trails B, and logical memory showed improvements after training. This preliminary study evaluated whether an 8-week meditation program resulted in improvements in neuropsychological function and differences in CBF in subjects with memory loss. While the findings are encouraging, there are a number of limitations that can be addressed in future studies with more participants and more detailed analyses.

**Keywords:** Cerebral blood flow, cognitive impairment, meditation, memory, single photon emission computed tomography

## Effects of an 8-Week Meditation Program on Mood and Anxiety in Patients with Memory Loss

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### Abstract

**Background:** This study assesses changes in mood and anxiety in a cohort of subjects with memory loss who participated in an 8-week *Kirtan Kriya* meditation program. Perceived spirituality also was assessed. Previous reports from this cohort showed changes in cognitive function and cerebral blood flow (CBF). The purpose of this analysis was to assess outcome measures of mood and affect, and also spirituality, and to determine whether or not results correlated with changes in CBF.

**Methods:** Fifteen (15) subjects (mean age  $62 \pm 7$  years) with memory problems were enrolled in an 8-week meditation program. Before and after the 8-week meditation, subjects were given a battery of neuropsychologic tests as well as measures of mood, anxiety, and spirituality. In addition, they underwent single photon emission computed tomography scans before and after the program. A region-of-interest template obtained counts in several brain structures that could also be compared to the results from the affect and spirituality measures.

**Results:** The meditation training program resulted in notable improvement trends in mood, anxiety, tension, and fatigue, with some parameters reaching statistical significance. All major trends correlated with changes in CBF. There were nonsignificant trends in spirituality scores that did not correlate with changes in CBF.

**Conclusions:** An 8-week, 12 minute a day meditation program in patients with memory loss was associated with positive changes in mood, anxiety, and other neuropsychologic parameters, and these changes correlated with changes in CBF. A larger-scale study is needed to confirm these findings and better elucidate mechanisms of change.

## Dr. Newberg's exercise exploring how people define "God"

Dr. Newberg performed an informal study in which he asked people to draw a picture of God; handing out a piece of blank paper and a pencil.

- 1) Instructions
  - a. Draw what they thought would be representative of God.
  - b. Describe their drawing in one or two sentences so that we would be sure to interpret the drawing correctly.
- 2) The results of almost three hundred drawings revealed some interesting findings.
  - a. Approximately 20 percent conceived of God in some type of humanized form and drew God in an anthropomorphic way, such as a person or face.
  - b. Approximately 33 percent drew a natural scene such as a forest or mountain with the sun in the sky, or perhaps a picture of the galaxy.
  - c. Approximately 33 percent drew something abstract with circles, hearts, or swirling patterns.
- 3) These results show:
  - a. 20 percent of our sample actually conceived of God in some type of humanized form.
  - b. 67 percent of our sample viewed God as a spiritual or abstract essence of the universe.
  - c. 13 percent of the pages we handed out were returned with nothing drawn. But these blank pages did contain descriptions of why they were left blank.
    - i. Atheists, they left it blank because they did not believe God existed, so there was nothing to draw. (what %?)
    - ii. Religious people stated that God was "undrawable" and so they left it blank. (what %?)

In much the same way that the name of God is represented as the Tetragrammaton—*YHVH*—in Judaism, God sometimes cannot even be conceived in any kind of human mental process.

## Baylor University Research

A study by a group of researchers at Baylor University evaluated a variety of aspects related to religion and religious beliefs. When it came to the notion of God, the researchers determined from their study that of the almost two thousand respondents, their concepts of God could be placed into four basic categories (although the researchers recognized that people often extended their conception of God over several categories).

Their results suggested that the four “types of God” were:  
Related to Spatial function of brain: closeness and distance

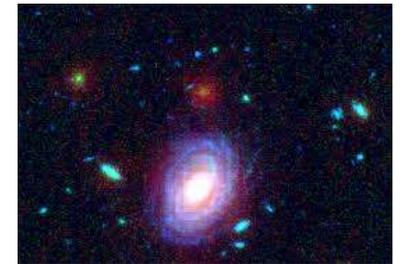
1. Authoritarian
2. Distant

Related to the Emotional function of the brain

1. Critical
2. Benevolent



Authoritarian



Distant



Critical



Benevolent

## Possible practical applications of neuroscience.

1. Perhaps we can learn something from neuroscientific or psychological analyses that might help better determine why some people are enticed by highly negative doctrines that espouse hate and violence. And perhaps we might be able to find ways of redirecting individuals down more constructive and positive paths.
2. It would be fascinating to try to repeat the Baylor study with an entirely Jewish population to see the similarities and differences with other traditions or within the different denominations.
3. Adding neuroscientific data might provide a new perspective on various questions.
  - a. It might be highly useful for rabbis to consider engaging their congregation in questions about the definition of religion and spirituality, the beliefs people have about God, or the nature of free will.
  - b. Understanding what traditions, stories, and holidays are the most meaningful and important to people might provide rabbis a useful guide for the development of future liturgy and synagogue programs.
  - c. Consider how to utilize neurotheological data to affect future liturgy. For example, current data suggests that the human brain has a working memory capacity of approximately four or five “chunks” of information. This means that a person can typically remember or work with only a few pieces of information at a time. Keeping sermons short and emphasizing four or five key points are likely to be the most effective and remembered for their impact.



## Possible practical applications of neuroscience, cont.

4. Other data suggests that slowing down speech makes it easier to remember and incorporate into your thoughts and beliefs.



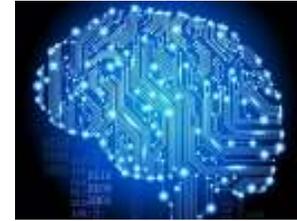
5. In addition, focusing on simple breathing techniques can result in powerful brain changes and experiences.

When Dr. Newberg presented on neurotheology at a local synagogue, the congregation decided to perform the *Sh'ma* in a slightly different way. Each word was said using a single breath. Thus, everyone took a deep breath in and recited the next word as they exhaled all the way out.



This dramatically slowed the pace of the prayer and allowed people to deeply focus on its meaning. Many people commented to Dr. Newberg later on that it was a highly powerful prayer experience.

## Are we "hard-wired" for God?



Dr. Andrew Newberg:

*“The term "hard-wired" suggests that we were purposefully designed that way. Neuroscience cannot answer the question of purposeful design.*

*However, what we can say is that the brain has two primary functions that can be considered from either a biological or evolutionary perspective. These two functions are self-maintenance and self-transcendence. The brain performs both of these functions throughout our lives. It turns out that religion also performs these two same functions.*

*So, from the brain's perspective, religion is a wonderful tool because religion helps the brain perform its primary functions. **Unless the human brain undergoes some fundamental change in its function, religion and God will be here for a very long time.**”*

Neuroscience does not and cannot answer whether or not God exists.

Whether this belief is ultimately a consequence of random evolution, divinely designed evolution, or programmed into the first human is not a question that neuroscience answers.